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CORRECTIVE ACTION PLAN FOR UST NS200 BUILDING 200 ZONE I SITE IDENTIFICATION # 17624 CNC CHARLESTON SC

4/1/2001

CH2M HILL

CORRECTIVE ACTION PLAN
FOR
UST NS200, BUILDING 200, ZONE I

Site Identification # 17624

Charleston Naval Complex
North Charleston, South Carolina

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Contract Number N62467-99-C-0960

April 2001

CORRECTIVE ACTION PLAN
FOR
UST NS200, BUILDING 200, ZONE I

Site Identification # 17624

Charleston Naval Complex
North Charleston, South Carolina

Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
Charleston, South Carolina 29406

Submitted by:
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Contract Number: N62467-99-C-0960

April 2001

ACRONYMS

AFVR	Aggressive Fluid - Vapor Recovery
bls	below land surface
BTEX	benzene, toluene, ethylbenzene and xylenes
BRAC	Defense Base Realignment and Closure Act
CAP	Corrective Action Plan
CAR	Contamination Assessment Report
CNC	Charleston Naval Complex
CoC	Chemical of Concern
CSAP	Comprehensive Sampling and Analysis Plan
DET	Environmental Detachment Charleston
DOT	Department of Transportation
EISOPQAM	Environmental Investigations Standard Operating Procedures and Quality Assurance Manual
EPA	Environmental Protection Agency
ft bls	feet below land surface
µg/kg	microgram per kilogram
µg/L	microgram per liter
OVA	Organic Vapor Analyzer
QA	Quality Assurance
QC	Quality Control
RA	Rapid Assessment
RAR	Rapid Assessment Report
RBSL	Risk-Based Screening Level
RCRA	Resource Conservation Recovery Act
RFI	RCRA Facility Investigation
SCDHEC	South Carolina Department of Health and Environmental Control
SOUTHDIV	Southern Division Naval Facilities Engineering Command
SSTL	Site-Specific Target Level
TTNUS	Tetra Tech NUS
UST	Underground Storage Tank

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Notes

1.0 INTRODUCTION

This Corrective Action Plan (CAP) has been prepared by CH2M-JONES, LLC. The plan is designed for UST NS200, Building 200, Zone I; located at the Charleston Naval Complex (CNC), North Charleston, South Carolina. UST NS200 contains the location of a former petroleum Underground Storage Tank (UST) system used to supply fuel oil to the heating system for Building 200. The South Carolina Department of Health and Environmental Control (SCDHEC) has designated this site as Identification Number: 17624.

This CAP provides a method for intrinsic remediation of the site by monitoring and natural attenuation; if intrinsic remediation is not effective, the CAP provides procedures to implement active remediation as a corrective action in accordance with SCDHEC Corrective Action Guidance, June 1997. The CAP was developed using the information provided in the Rapid Assessment Report (RAR) for UST NS200 prepared by Tetra Tech NUS, Inc. (TTNUS), dated January 2000. The applicable tables and figures from the RAR have been incorporated into this CAP.

1.1 General Site Description

The CNC is located in the city of North Charleston, on the west bank of the Cooper River in Charleston County, South Carolina (Figure 1). This installation consists of two major areas: an undeveloped dredge materials area on the east bank of the Cooper River on Daniel Island in Berkley County, and a developed area on the west bank of the Cooper River. The developed portion of the base is on the peninsula bounded on the west by the Ashley River and on the east by the Cooper River. The site is located within the developed portion of the base (Figure 2).

The area surrounding CNC is "mature urban", having long been developed with commercial, industrial, and residential land use. Commercial areas are primarily west of CNC; industrial areas are primarily to the north of the base along Shipyard Creek. A site vicinity map, which exhibits adjacent properties and structures, vicinity roads, current utilities, and vicinity surface drainage, is included as Figure 2.

1.2 Site Background

The CNC began operations in 1901, when the Navy acquired the property. In 1993, the CNC was added to the list of bases scheduled for closure under the Defense Base Realignment and Closure Act (BRAC). BRAC regulates the closure of the base and transition of the property back to the community. With the scheduled closure of the base, environmental cleanup has proceeded to make the property available for redevelopment after closure.

Building NS200 is a former office building located in the northern half of Zone I at CNC. Zone I consists of the southern bank of the Cooper River between the former Naval Station Pier P and the tip of the CNC at the intersection of the Cooper River and Shipyard Creek. Building NS200 is located on the north side of Hobson Avenue between Piers R and S (Figure 2), and is currently occupied by the National Oceanic and Atmospheric Administration

(NOAA) Coastal Service Center. The UST at Building NS200 was a 1,000-gallon unregulated fuel oil UST installed in 1953. The UST supplied fuel oil to operate the building's heating system. The UST was located on the eastern side of the building between Building NS200 and Building NS16 (Figure 3).

Between April 16, 1996 and April 29, 1996, UST NS200 and its distribution lines were removed from the site. Although releases from the tank were not recorded while the tank was in service, fuel oil had apparently leaked into the soil from a ventilation pipe that was open to the subsurface. Petroleum-contaminated soil was identified during the removal activities based upon soil sampling results. Excavated soil was transferred to a pilot bioremediation project at the CNC, and the excavation was filled to grade with clean soil and backfill. A thin sheen of free product was observed on a small puddle of water (approximately 2 feet by 2 feet by less than 1 inch deep) that accumulated in the excavation during the UST removal.

From April 6, 1998 through July 8, 1998, the Environmental Detachment Charleston (DET) conducted a field investigation. DET presented the results of the investigation in its Contamination Assessment Report (CAR; March 10, 1999). To supplement the DET investigation, TTNUS completed a Rapid Assessment (RA) for UST NS200. During the RA, TTNUS reviewed available documents, measured groundwater levels, and conducted Tier 1 and Tier 2 evaluations of the risk present at the site. The information from the Rapid Assessment Report (RAR), prepared by TTNUS, dated January 2000, is summarized in Section 2.0 of this report. The RAR was approved by SCDHEC on February 24, 2000.

The site lies within the Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI) Zone I, part of an ongoing RFI for the CNC facility. Information collected during the RFI, including geological data, hydrogeological data, well drilling logs, and groundwater sampling data, were used in the preparation of the CAR, the RAR and the CAP.

Notes

2.0 RAPID ASSESSMENT SUMMARY

TTNUS completed a Rapid Assessment Report (RAR), dated January 2000, for UST NS200, Building NS200, Zone I. The assessment information was used to develop this CAP. The information from the RAR is summarized in this section.

2.1 Receptor Survey

A receptor survey of the site vicinity was conducted by TTNUS personnel to identify potential receptors for petroleum hydrocarbon contamination. Figure 2 depicts the public utilities located within 500 feet of the former UST study area. The receptor utilities located on or near the site include sanitary sewer, potable water, storm sewer, and electrical. Specific information concerning the depth of utilities below land surface is currently unavailable, however, utilities at this site generally are between 2 to 6 feet below land surface (ft bls).

A survey of groundwater users within a 7-mile radius of CNC was conducted by the South Carolina Water Resources Commission to ascertain the extent of any shallow groundwater usage. Results of the water use investigation revealed that no shallow potable water wells are located within a 4-mile radius of the site. Numerous monitoring wells are located within 1,000 feet of the site. The nearest surface water body to UST NS200 is Cooper River located approximately 170 feet to the north.

There are no city, county or state-zoning ordinances, since the federal government currently owns the CNC property. Information concerning zoning ordinances was obtained from the SOUTHDIV Remedial Project Manager located at 2155 Eagle Drive, North Charleston, South Carolina 29406.

2.2 Assessment Information

On June 17, 1998, three temporary monitoring wells (NBCT200TW01, NBCT200TW02, and NBCT200TW03) were advanced under the supervision of DET. In addition, DET installed and sampled twenty-five (25) soil borings for site characterization and collected groundwater samples from the three temporary monitoring wells. DET also delineated the areal extent of free product found in NBCT200TW01 by installing and sampling seven (7) soil borings. One additional well, NBCL037001I, had been previously installed on-site during the Zone I RFI. During the DET investigation, a groundwater sample was collected from this permanent monitoring well. Sample locations are shown on Figure 3. The soil and groundwater laboratory sampling data from the DET investigation are summarized in Tables 4 and 5.

As reported in the RAR, the site lithology consists of sandy fill material from ground surface to approximately 2 to 5 ft bls. The fill material is underlain by a silty sand unit approximately 2 feet thick. The silty sand unit is underlain by a clay unit (approximately 12 feet thick) with sand interbeds. Beneath the clay is a sand unit that contains clay matrix or clay interbeds. Two geologic cross sections of the site are depicted in Figures 4 and 5. Groundwater levels ranged from 5 to 10 ft bls (Table 3). Based upon groundwater level measurements collected on

September 30, 1998 (low tide), surficial groundwater flow is to the southwest; a groundwater potentiometric map for this date is presented in Figure 9. The Zone I RFI indicated that the groundwater flow direction for the area is generally toward the Cooper River to the east. TTNUS hypothesized that the different groundwater flow direction in the area of UST NS200 may be due to marine wall pilings along the shipyard front, tidal influences, sewer line leakages in the area, or infiltration to the gravity sewer line.

During the RA, benzene and naphthalene exceeded soil leaching Risk-Based Screening Levels (RBSLs) established by SCDHEC (Risk-Based Corrective Action For Petroleum Release, January 5, 1998) (Table 4). The benzene RBSL was exceeded in a soil sample collected from boring NBCT200S10. The naphthalene RBSL was exceeded in soil samples collected from borings NBCT200S02, NBCT200S03, NBCT200S10, NBCT200S14, NBCT200TW01, and NBCT200TW02. The soil concentrations of benzene and naphthalene did not exceed the dermal, ingestion, or inhalation RBSLs. The analytical results of chemicals of concern (CoCs) for soil boring samples and split spoon samples collected during monitoring well installation are presented on Figure 6.

During groundwater measurement events, free product was detected in one well location (NBCT200TW01), with measurements ranging from sheen to 0.87 feet thickness (Table 3). Interim free product recovery operations were conducted at the site by DET. Free product was removed with a bailer once per week at low tide, reducing the measured free product thickness from a maximum of 0.87 feet (October 30, 1998) to a minimum of 0.01 feet (October 20, 1999). Free product thickness was found to vary with the tides, increasing by as much as five inches during high tide (compared with measurements collected at low tide on the same day). The analytical results of CoCs for groundwater are presented on Figure 7. The estimated areal extent of free product is depicted on Figure 8.

2.3 Fate and Transport Modeling

For concentrations of contaminants in wells containing free product, the maximum solubility in equilibrium with fuel oil was calculated using Raoult's Law. Calculated concentrations for benzene, toluene and naphthalene in equilibrium with free product exceeded their respective RBSLs (Appendix D, TTNUS, January, 2000).

In one well (NBCT200TW02) that did not contain free product, naphthalene was identified above its RBSL (Table 5). The distribution of CoCs in groundwater is presented in Figure 7. The aquifer characterization calculated by TTNUS and the fate and transport parameters determined by TTNUS during the RA are presented in Sections 2.10 and 2.11, respectively, of the TTNUS RAR. The Domenico model was used to predict the distance at which the tip of the contaminant plume is attenuated to SCDHEC RBSLs in 10 and 20 years, respectively. The model showed that the Cooper River, located approximately 170 feet from the source area, would not be protected from exposure to benzene.

2.4 Exposure Pathway Analysis

In the RA, TTNUS evaluated the receptor characterizations of the potentially exposed populations in the vicinity of the site and identified the potentially complete exposure pathways for those receptors. Exposure pathway analysis for current land use and future land is summarized in Tables 1 and 2.

2.5 Site-Specific Target Levels (SSTLs)

In the RA, TTNUS considered the following scenarios for the calculations of SSTLs: ingestion of, dermal contact with, or inhalation of vapors from subsurface soil for a construction worker in a trench; ingestion of, dermal contact with, or inhalation of vapors from contaminated groundwater by a construction worker in a trench; and, ingestion of surface water from the Cooper River (considered as a surface water receptor). No other exposure routes pathways were considered likely threats.

SSTLs were calculated for soils for the CoCs benzene and naphthalene because these soil contaminant concentrations exceeded RBSLs. Observed site concentrations of benzene and naphthalene in soil did not exceed their respective calculated SSTLs, therefore it was determined that benzene and naphthalene in the soil do not pose a threat to a construction worker in a utility trench. SSTLs were calculated for benzene and naphthalene in groundwater because these groundwater contaminant concentrations exceeded their respective RBSLs. Observed site concentrations of benzene and naphthalene exceeded their respective calculated SSTLs, therefore it was determined that benzene and naphthalene in groundwater pose a threat to the construction worker in a utility trench and to the Cooper River. The minimum RBSLs were selected for each CoC (from the list of Dermal RBSL, Incidental Ingestion RBSL, and Inhalation RBSL). The soil and groundwater contaminant concentrations are compared to the RBSLs and calculated groundwater SSTLs in tables presented in Section 3.5 of the RAR.

Contaminant concentrations of benzene and naphthalene in groundwater exceeded the minimum calculated SSTLs protective of a construction worker in a utility trench. Therefore, the petroleum contamination detected at UST NS200 may pose a threat to construction workers in nearby utilities.

Notes

3.0 PROPOSED CORRECTIVE ACTION

This CAP provides a method for remediation of the contaminant plume identified in the vicinity of the former UST NS200 basin by implementing intrinsic remediation and monitoring well abandonment as a corrective action in accordance with SCDHEC Corrective Action Guidance, June 1997. Quarterly groundwater sampling will be conducted to evaluate the effectiveness of intrinsic remediation at the site. Intrinsic remediation will be implemented until contaminant concentrations decrease below RBSLs or action levels approved by SCHDEC. Based on groundwater samples collected by CH2M-Jones, LLC on April 12, 2001 (Table 6), free product is no longer present in groundwater monitoring well NBCT200TW01. Therefore, source removal of free petroleum product is not needed at this time. If monitoring and natural attenuation appears to have little effect on the contaminant levels in the groundwater, or if free product reappears in NBCT200TW01, active remediation of the site will be implemented. Active remediation, if necessary, will include the removal of free petroleum product using periodic bailing of product from wells in addition to enhanced bioremediation via targeted injection of oxygen enhancing compounds. Active remediation would then be followed by intrinsic remediation and monitoring. The proposed active remediation plan to be implemented if free product reappears is described in Section 4.0, and the proposed intrinsic remediation plan is described in Section 5.0.

3.1 Soil Remediation

Because no soil contaminant concentration exceeded the dermal, incidental ingestion, or inhalation SSTLs in the RA, active soil remediation as a part of this CAP is not warranted at this time.

3.2 Groundwater Remediation

Free product and groundwater contamination were identified in the vicinity of the former UST NS200 basin. Contaminant concentrations in groundwater exceeded the minimum calculated SSTLs protective of a construction worker in a utility trench. The maximum source concentrations for groundwater were calculated based upon the presence of free product using Raoult's Law. Groundwater samples collected by CH2M-Jones, LLC on April 12, 2001 (Table 6) indicated that free product is no longer present. If the monitoring events proposed as part of the intrinsic remediation of the site indicate that free product has reappeared, then active groundwater remediation will be implemented. Active groundwater remediation will include the removal of any free product identified in the vicinity of the former UST NS200 basin and groundwater sampling to evaluate the active remediation of the site.

The following document was used as a source for remedial design: *How to Effectively Recover Free Product at Leaking Underground Storage Tank Sites* [United States Environmental Protection Agency (EPA), 1996]. Four approaches were considered for free product recovery: manual removal of free product via periodic bailing; bioremediation (injection); passive removal/skimmer system; and, dual-phase vapor and groundwater recovery.

It is anticipated that any free product efforts that may be necessary will be conducted at groundwater monitoring well NBCT200TW01. Due to the limited area of free product estimated for this site, the active remedial strategy designed for the UST NS200 site includes manual removal of free product through periodic bailing. Bailing will continue until reduced volumes indicate that intrinsic remediation may proceed. If manual abatement of free product is not achievable within six months of being implemented, or if contaminant concentrations continue to remain above the minimum calculated SSTLs, the remedial strategy will include enhanced bioremediation. Enhanced bioremediation may be used to target specific locations to enhance the natural degradation of contaminants at the site. Bioremediation may consist of the injection of an oxygenate to stimulate microbes with an affinity towards digesting specific contaminants under aerobic conditions. Typically, the oxygen enhancing compound can be injected through well points that are installed into the contaminated zone using direct push technology.

A passive removal/skimmer system may be implemented at the site to remove free product. A passive, floating skimmer with a product recovery filter canister is designed to remove free product down to a sheen or thickness of 0.01 feet thickness. Typically, the skimmer is lowered into the well until the midpoint of the skimmer is located at the fluid level in the well. Floating hydrocarbons (free product) enters the skimmer through the floating intake outer debris screen and then through an inner oileophilic hydrophobic screen, and down into a clear canister for storage. To empty the skimmer, the device is brought to the surface, and the canister is drained using the discharge valve at the skimmer base. A dedicated, free product bailer will be utilized to remove free product from the top of the wells in the target area if free product thickness is near or less than 0.01 feet.

Other active removal methods may be employed if free product persists at the site, including an 8-hour Aggressive Fluid – Vapor Recovery (AFVR) event or multiple events to remove free product from the source area. The AFVR may consist of a vacuum truck utilized to extract fluid and vapor from target well points. The AFVR assembly would connect the vacuum hose to the top of the wellhead with the design such that liquid and vapor would be extracted from the top of the water column in the target well point.

Notes

4.0 PROPOSED ACTIVE REMEDIATION

Active remediation of the site may be necessary if monitoring conducted during intrinsic remediation indicates that free product has reappeared at the site. Active remediation, if necessary, will include manual removal of free product from the water table through periodic bailing of free product from monitoring well NBCT200TW01. If manual abatement is not achievable within 6 months of being implemented, additional active remediation activities will be performed, including enhanced bioremediation and conducting groundwater sampling to evaluate the active remediation of the site. Based on the information obtained during the active remediation and the results of the subsequent groundwater monitoring, the following actions may be considered if free product continues to persist at the site and/or groundwater contaminant concentrations do not decrease: installation of a passive removal/skimmer system and/or performance of an 8-hour AFVR event or multiple events.

4.1 Free Product Recovery

If necessary, free product will be removed by bailing free product from monitoring well NBCT200TW01 beginning with a weekly recovery schedule. If manual abatement is not achievable, additional active remediation activities will be performed, including enhanced bioremediation and conducting groundwater sampling to evaluate the active remediation of the site. The former UST basin and the associated contaminant plume will be the target area if bioremediation is warranted at the site. An SCDHEC-approved bioremediation product will be utilized at the site. The bioremediation product will be delivered into the contaminated zone through injection points typically installed using direct push technology in a grid pattern over the target area.

If free product persists at the site after the injection of bioremediation materials, additional recovery methods will be evaluated. The type of remedial action required will depend upon the observed residual product thickness. Options to be evaluated may include a passive removal/skimmer system or an AFVR event.

If a skimmer is selected for additional removal of free product, a passive, floating skimmer with a product recovery filter canister will be used. A Product Recovery Canister (Model PRC-94) or an equivalent device for a 2-inch diameter well and/or a 4-inch diameter well with a capacity of 0.25 liter or greater should be adequate for the conditions at the site assuming that product levels are greater than 0.01 feet in recovery wells. A minimum thickness of 0.01 feet is required for the Model PRC-94 and most passive skimmer devices. A dedicated, free product bailer will be utilized to remove free product from the top of the wells if free product thickness is near or less than 0.01 feet.

Monitoring well NBCT200TW01 may be used as the target well point if AFVR is warranted for this site. Any free product and contaminated groundwater from the AFVR event will be containerized in a tanker vehicle and disposed at an appropriate facility based upon fluid contents.

SCDHEC will be contacted prior to the implementation of the different remedial approaches at the site, if AFVR and bioremediation is warranted at the site.

4.2 Monitoring Well Installation

No new monitoring wells are proposed for the site. However, if new wells are warranted for any reason, the wells will be installed to the same specification as existing monitoring wells unless site conditions change and warrant otherwise. The wells will be installed in accordance with South Carolina Well Standards and Regulations R.61-71. A utility locate will be completed prior to any well installation activities. Any necessary permits will be acquired prior to well installation activities.

4.3 Surveying

Surveying of any new well locations will be conducted as a part of this CAP.

4.4 Soil Boring Schedule

Because no soil contaminant concentration exceeded dermal, incidental ingestion, or inhalation SSTLs in the RA, no soil borings are scheduled to be installed in this CAP unless site conditions change and warrant otherwise.

4.5 Sampling and Analysis Plan

Once free product has been removed from the site, groundwater samples will be collected from all monitoring wells. The groundwater samples will be submitted to a certified laboratory for analysis of benzene, toluene, ethylbenzene and xylenes (BTEX) and naphthalene by EPA Method 8260.

Groundwater level measurements will be collected from all monitoring wells prior to all groundwater sampling events. Measurements will be taken with an electrical water level indicator or interface probe if floating product is present. No groundwater samples will be collected if free product is measurable.

Three to six well volumes will be purged from each well prior to groundwater sampling. Field measurements of pH, groundwater temperature, specific conductance, dissolved oxygen, and turbidity will be taken during groundwater sampling events.

All sampling procedures will be conducted in accordance with EPA Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM), 1996. Any contaminated groundwater collected during the well sampling events will be containerized in Department of Transportation (DOT)-approved (Specification 7H) 55-gallon drums and disposed of at a later date pending fluid contents analysis.

4.6 Reporting

Semi-annual monitoring reports will be submitted to SCDHEC. The reports will summarize and include copies of field and laboratory analytical data. Upon completion of active remediation, a Performance Evaluation Report will also be submitted to SCDHEC to summarizes the remediation activities, evaluate the soil and water quality data, and provide recommendations for the site.

4.7 Equipment Decontamination

All drilling equipment, augers, well casing and screens, and soil and groundwater sampling equipment involved in field sampling activities will be decontaminated according to the EPA EISOPQAM.

4.8 Sample Handling

Sample handling will be conducted in accordance to the following references: EPA EISOPQAM, Code of Federal Regulations 136, 1990, and EPA Users Guide to Contract Laboratory Program, 1988. The following forms will be completed for packing/shipping process: sample labels, chain-of-custody labels, appropriate labels applied to shipping coolers, and chain-of-custody forms.

4.9 Quality Control

In addition to periodic calibration of field equipment and the completions of the appropriate documentation, quality control (QC) samples will be collected during sampling events. QC samples may include field blanks, field duplicates, and trip blanks. Definitions of each can be found below as described by the EPA EISOPQAM:

- **Field Blank:** A sample collected using organic-free water, which has been run over/through sample collection equipment. These samples are used to determine if contaminants have been introduced by contact of the sample medium with sampling equipment. Equipment field blanks are often associated with collecting rinse blanks of equipment that has been field cleaned.

- **Field Duplicates:** Two or more samples collected from a common source. The purpose of a duplicate sample is to estimate the variability of a given characteristic or contamination associated with a population.

- **Trip Blank:** A sample, which is prepared prior to the sampling event in the actual container and is stored with the investigative samples throughout the sampling event. They are often packaged for shipment with the other samples and submitted for analysis. At no time after their preparation are trip blanks to be opened before they reach the laboratory. Trip blanks are used to determine if samples were contaminated during storage and/or transportation back to the laboratory (a measure of sample handling variability resulting in positive bias in contaminant concentration). If samples

are to be shipped, trip blanks are to be provided with each shipment but not for each cooler.

4.10 Field Quality Assurance / Quality Control (QA/QC)

All sampling procedures will be conducted in accordance with EPA EISOPQAM. More information on field QC can be found in Sections 4.7 through 4.9.

QA/QC specifications for selected field measurements are summarized below.

Analysis	Control Parameter	Control Limit	Corrective Action
Air Monitoring	Check Calibration of OVA daily	Calibrate to manufactures specifications	Recalibrate. If unable to calibrate, replace.
pH of water	Continuing calibration check of pH 7.0 buffer	pH = 7.0	Recalibrate. If unable to calibrate, replace electrode.
Specific Conductance of water	Continuing calibration check of standard solution	> 1% of standard	Recalibrate.

4.11 Record keeping

In addition to required sampling documentation (see Section 4.8), standardized forms, log sheets and logbooks will be completed during all field activities.

Notes

5.0 PROPOSED INTRINSIC REMEDIATION

This CAP provides a method for implementing intrinsic remediation and monitoring well abandonment as a corrective action in accordance with SCDHEC Corrective Action Guidance, June 1997. If active remediation is warranted, intrinsic remediation will be implemented upon completion of active remediation until contaminant concentrations decrease below RBSLs or other action levels approved by SCHDEC.

5.1 Monitoring Well Installation

Assuming the wells currently in place are in good condition, no monitoring wells will be installed for the CAP. If any wells are unusable or new wells are warranted for any other reason, the wells will be installed to the same specification as existing monitoring wells unless site conditions change and warrant otherwise.

5.2 Surveying

No new monitoring wells are scheduled to be installed as a part of the intrinsic CAP. Surveying of any new well locations will be conducted if warranted.

5.3 Soil Boring Schedule

No other soils borings are scheduled for the CAP unless site conditions change and warrant otherwise.

5.4 Monitoring Well Abandonment

All monitoring wells will be abandoned upon receiving approval by SCDHEC. The wells will be abandoned following the South Carolina Well Standards and Regulations R.61-71. The well abandonment will include grouting wells, removing stick-ups and removing all guard posts. Any well casing and screen removed will be decontaminated and disposed of as general refuse.

5.5 Sampling and Analysis Plan

Groundwater samples will be collected twice (semi-annually) over a period of 12 months from monitoring wells NBCT200TW01, NBCT200TW02, NBCT200TW03, and NBCL037001I. The groundwater samples will be submitted to a certified laboratory for analysis of BTEX and naphthalene by EPA Method 8260. The following parameters will also be considered for analysis in order to evaluate the effectiveness of intrinsic remediation: nitrate (NO^{-3}), sulfate (SO^{-4}), total dissolved iron, methane (CH_4), and alkalinity. A determination of No Further Action (NFA) may be requested for the site upon completion of two quarterly sampling events, if the quarterly sampling data indicate that significant levels of contaminants are not present.

Groundwater level measurements will be collected from all monitoring wells prior to all groundwater sampling events. Measurements will be taken with an electrical water level

indicator or interface probe if floating product is present. No groundwater samples will be collected if free product is measurable.

Three to six well volumes will be purged from each well prior to groundwater sampling. Field measurements of pH, groundwater temperature, specific conductance, dissolved oxygen, and turbidity will be taken during groundwater sampling events.

All sampling procedures will be conducted in accordance with EPA EISOPQAM. Any contaminated groundwater collected during the well sampling events will be containerized in DOT-approved (Specification 7H) 55-gallon drums and disposed of at a later date pending fluid contents analysis.

5.6 Reporting

Semi-annual monitoring reports will be submitted to SCDHEC. The reports will summarize and include copies of field and laboratory analytical data. Upon completion of the two groundwater sampling events over the 12 month period, a Performance Evaluation Report will also be submitted to SCDHEC to summarize the sampling activities, evaluate the soil and water quality data, and provide recommendations for the site.

Notes

6.0 SITE MANAGEMENT AND BASE SUPPORT

Throughout the investigation activities, work on the CNC will be coordinated through SOUTHDIV and SCDHEC.

The primary contacts for each are as follows:

1. SOUTHDIV point of contact
   Gabe Magwood
   Southern Division Engineering Command
   2155 Eagle Drive
   North Charleston, SC 29406
   (843) 820-7307

2. SOUTHDIV point of contact
   Tony Hunt
   Southern Division Engineering Command
   2155 Eagle Drive
   North Charleston, SC 29406
   (843) 820-5525

3. SCDHEC point of contact
   Michael Bishop
   South Carolina Department of Health and Environmental Control
   2600 Bull Street
   Columbia, SC 29201
   (843) 898-4300

Notes

7.0 REFERENCES

Comprehensive Sampling and Analysis Plan (Ensafe/ Allen & Hoshall. July 1996).

South Carolina Department of Health and Environmental Control. 1997. Corrective Action Guidance.

Tetra Tech NUS, Inc. September 1999. Rapid Assessment Report for UST NS200, Building 200, Zone I, North Charleston, South Carolina.

United States Environmental Protection Agency. 1990. Code of Federal Regulations 136.

United States Environmental Protection Agency. 1996. EPA Environmental Investigations Standard Operating Procedures for Quality Assurance Manual.

United States Environmental Protection Agency. 1988. EPA How to Effectively Recover Free Product at Leaking Underground Storage Tank Sites.

TABLE 1

CURRENT LAND USE - POTENTIAL RECEPTORS AND PATHWAYS WITHIN 1,000-FOOT RADIUS
UST 200, BUILDING NS200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Media (for exposure)	Exposure Route	Pathway Selected for Evaluation?	Exposure point or Reason for Non-Selection	Data Requirements
Air	Inhalation	No	No volatilization to enclosed space.	
	Explosion Hazard	No	No explosion hazard.	
Groundwater	Ingestion	Yes	No water supply well downgradient. All water supplied by city. However, construction worker could be exposed to groundwater in utility trench.	RBSLs for construction worker exposure to groundwater.
	Dermal Contact	Yes		
	Volatile Inhalation	Yes		
Surface Water	Ingestion	Yes	Cooper River is 170 feet to the north (upgradient but downslope).	SSTLs for surface water ingestion at Cooper River.
	Dermal Contact	No		
	Volatile Inhalation	No		
Surficial Soil	Ingestion	No	No impacted surface soil. Asphalt and concrete cover impacted soil.	
	Dermal Contact	No		
	Volatile Inhalation	No		
	Leaching to Groundwater	No		
Subsurface Soil	Ingestion	Yes	Construction worker in a utility trench could be exposed to contaminated soil and soil vapors. Sandy soils; groundwater is shallow: ~5 feet bls.	
	Dermal Contact	Yes		
	Volatile Inhalation	Yes		
	Leaching to Groundwater	Yes		

TABLE 2

FUTURE LAND USE - POTENTIAL RECEPTORS AND PATHWAYS WITHIN 1,000-FOOT RADIUS
UST 200, BUILDING NS200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Media (for exposure)	Exposure Route	Pathway Selected for Evaluation?	Exposure point or Reason for Non-Selection	Data Requirements
Air	Inhalation	No	No volatilization to enclosed space.	
	Explosion Hazard	No	No explosion hazard.	
Groundwater	Ingestion	Yes	No water supply well downgradient. All water is supplied by city. However, construction worker could be exposed to groundwater in utility trench.	RBSLs for construction worker exposure to groundwater.
	Dermal Contact	Yes		
	Volatile Inhalation	Yes		
Surface Water	Ingestion	Yes	Cooper River is 170 feet to the north (upgradient but downslope).	SSTLs for surface water ingestion at Cooper River.
	Dermal Contact	No		
	Volatile Inhalation	No		
Surficial Soil	Ingestion	No	No impacted surface soil. Asphalt and concrete cover impacted soil.	
	Dermal Contact	No		
	Volatile Inhalation	No		
	Leaching to Groundwater	No		
Subsurface Soil	Ingestion	Yes	Construction worker in a utility trench could be exposed to contaminated soil and soil vapors. Sandy soils; groundwater is shallow: ~5 feet below land surface.	
	Dermal Contact	Yes		
	Volatile Inhalation	Yes		
	Leaching to Groundwater	Yes		

TABLE 3

GROUNDWATER ELEVATIONS
UST 200, BUILDING NS200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Monitoring Well No.	Depth to Bottom of Screen (ft)	Top of Casing Elevation (ft) (MSL)	Date Measured	Depth to Free Product (BTOC)	Depth to Water (ft) (BTOC)	Groundwater Elevation (ft) (MSL)
NBCT200TW01*	15.1	11.32	7/8/98	--	9.12	2.20
			9/30/98, LT	8.62	9.26	2.58
			9/30/98, HT	8.36	8.58	2.92
			10/2/98	NA	NA	NA
			10/14/98, LT	8.53	9.19	2.67
			10/14/98, HT	8.22	8.44	3.06
			10/30/98	9.27	10.14	1.89
			11/5/98	9.05	9.33	2.22
			11/13/98	9.50	10.10	1.71
			11/19/98	9.54	9.95	1.71
			12/3/98	9.70	10.05	1.56
			12/4/98	9.70	10.09	1.55
			1/12/99	9.46	9.88	1.78
			1/20/99	9.35	9.46	1.95
			1/26/99	8.51	8.66	2.78
			2/1/99	8.09	8.25	3.20
			2/17/99	9.08	9.18	2.22
			3/3/99	9.11	9.23	2.19
			10/20/99	7.32	7.33	4.00
NBCT200TW02	14.8	10.49	7/8/98		8.45	2.04
			9/30/98, LT		7.81	2.68
			9/30/98, HT		7.58	2.91
			10/2/98		7.75	2.74
			10/14/98, LT		7.65	2.84
			10/14/98, HT		7.41	3.08
			10/30/98		8.51	1.98
			11/5/98		8.24	2.25
			11/13/98		8.72	1.77
			11/19/98		8.73	1.76
			12/3/98		8.84	1.65
			12/4/98		8.83	1.66
			1/12/99		8.56	1.93
			1/20/99		8.47	2.02
			1/26/99		7.51	2.98
			2/1/99		7.05	3.44
			2/17/99		8.15	2.34
			3/3/99		8.21	2.28
			10/20/99		6.60	3.89

TABLE 3

GROUNDWATER ELEVATIONS
UST 200, BUILDING NS200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Monitoring Well No.	Depth to Bottom of Screen (ft)	Top of Casing Elevation (ft) (MSL)	Date Measured	Depth to Free Product (BTOC)	Depth to Water (ft) (BTOC)	Groundwater Elevation (ft) (MSL)
MBCT200TW03	14.5	9.93	7/8/98		7.75	2.18
			9/30/98, LT		8.19	1.74
			9/30/98, HT		7.23	2.70
			10/2/98		8.09	1.84
			10/14/98, LT		8.12	1.81
			10/14/98, HT		7.09	2.84
			10/30/98		8.60	1.33
			11/5/98		8.24	1.69
			11/13/98		8.72	1.21
			11/19/98		8.76	1.17
			12/3/98		8.84	1.09
			12/4/98		8.89	1.04
			1/12/99		8.80	1.13
			1/20/99		8.54	1.39
			1/26/99		8.09	1.84
			2/1/99		7.49	2.44
			2/17/99		8.46	1.47
			3/3/99		8.41	1.52
			10/20/99		6.46	3.47
NBCL037001I		6.61	7/8/98		4.59	2.02
			9/30/98, LT		3.85	2.76
			9/30/98, HT		3.68	2.93
			10/2/98		3.80	2.81
			10/14/98, LT		3.69	2.92
			10/14/98, HT		3.49	3.12
			10/30/98		4.59	2.02
			11/5/98		4.32	2.29
			11/13/98		4.82	1.79
			11/19/98		4.81	1.80
			12/3/98		4.92	1.69
			12/4/98		4.90	1.71
			1/12/99		4.63	1.98
			1/20/99		4.55	2.06
			1/26/99		3.53	3.08
			2/1/99		3.14	3.47
			2/17/99		4.24	2.37
			3/3/99		4.34	2.27
			10/20/99		2.64	3.97

Notes:

BTOC – below top of casing

MSL – mean sea level NA – not available

LT – low tide HT – high tide

* Groundwater elevation calculation corrected for free product thickness in well as follows:

GW Elev. = TOC Elev. - [DTW-0.82(DTW-DTP)]

TABLE 4

SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN SOIL
UST 200, BUILDING NS200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Site 200 / Soil Boring No. / Sample Depth	Benzene (mg/kg)	Ethyl-benzene (mg/kg)	Toluene (mg/kg)	Xylenes (total) (mg/kg)	Naphthalene (mg/kg)	Benzo(a) anthracene (mg/kg)	Benzo(b) fluoranthene (mg/kg)	Benzo(k) fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenzo(a,h) anthracene (mg/kg)	Cadmium (mg/kg)
RBSL [1]	**0.005**	**1.292**	**1.640**	**42.898**	**0.211**	**83.535**	**31.042**	**267.404**	**13.233**	**99.673**	**8.000**
RBSL [2]	**200**	**200,000**	**410,000**	**1,000,000**	**41,000**	**3.9**	**3.9**	**39**	**390**	**0.39**	**39**
200S010102	ND	0.017	0.023	0.001	ND	ND	ND	ND	ND	ND	ND
200S020106	0.002	0.002	ND	ND	**0.940**	ND	ND	ND	ND	ND	ND
200S030106	ND	0.001	ND	ND	**1.990**	ND	ND	ND	ND	ND	ND
200S080104	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
200S100103	0.014	0.003	0.006	0.002	**1.820**	ND	ND	ND	ND	ND	ND
200S110102	ND	0.022	ND	0.010	0.001	ND	ND	ND	ND	ND	ND
200S120101	ND	ND	ND	0.002	ND	ND	ND	ND	ND	ND	ND
200S130103	ND	ND	ND	0.002	ND	ND	ND	ND	ND	ND	ND
200S140103	ND	ND	ND	ND	**2.390**	ND	ND	ND	ND	ND	ND
200S150101	ND	0.001	ND	0.002	ND	ND	ND	ND	ND	ND	ND
200S160103	ND	0.002	ND	ND	0.005	ND	ND	ND	ND	ND	ND
200S170102	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
200S180102	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
200S190102	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
200S200101	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
200S210101	ND	ND	ND	0.002	ND	ND	ND	ND	ND	ND	ND
200S220102	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 4

SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN SOIL
UST 200, BUILDING NS200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Site 200 / Soil Boring No. / Sample Depth	Benzene (mg/kg)	Ethyl-benzene (mg/kg)	Toluene (mg/kg)	Xylenes (total) (mg/kg)	Naphthalene (mg/kg)	Benzo(a) anthracene (mg/kg)	Benzo(b) fluoranthene (mg/kg)	Benzo(k) fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenzo(a,h) anthracene (mg/kg)	Cadmium (mg/kg)
RBSL [1]	**0.005**	**1.292**	**1.640**	**42.898**	**0.211**	**83.535**	**31.042**	**267.404**	**13.233**	**99.673**	**8.000**
RBSL [2]	**200**	**200,000**	**410,000**	**1,000,000**	**41,000**	**3.9**	**3.9**	**39**	**390**	**0.39**	**39**
200S230102	ND	ND	ND	0.001	ND	ND	ND	ND	ND	ND	ND
200S240101	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
200S250102	ND	ND	ND	0.001	ND	ND	ND	ND	ND	ND	ND
200S260103	ND	ND	0.002	0.001	ND	ND	ND	ND	ND	ND	ND
200S270103	ND	ND	ND	0.001	ND	ND	ND	ND	ND	ND	ND
200S280102	ND	ND	0.002	0.001	0.028	ND	ND	ND	ND	ND	ND
200S290103	ND	ND	ND	ND	0.001	ND	ND	ND	ND	ND	ND
200S310103	ND	ND	ND	0.003	ND	ND	ND	ND	ND	ND	ND
200TW10102	ND	0.006	0.008	0.016	**2.080**	ND	ND	ND	ND	ND	0.059
200TW10204	ND	ND	ND	ND	**0.858**	ND	ND	ND	ND	ND	0.256
200TW20102	ND	0.003	ND	0.002	**0.516**	ND	ND	ND	ND	ND	0.221
200TW20204	ND	ND	ND	ND	0.013	ND	ND	ND	ND	ND	0.168
200TW30102	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.650

Notes:

Sample Collection Date: April 1998.

[1] RBSL for sandy soil; depth to groundwater 5 to 10 ft bls.

[2] RBSL for Commercial site where ingestion or dermal contact with surficial soil occurs.

ND -- Not detected above laboratory practical quantitation limit.

TABLE 5

SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN GROUNDWATER
UST 200, BUILDING NS200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Monitoring Well I.D.	Benzene (ug/L)	Ethyl-benzene (ug/L)	Toluene (ug/L)	Xylenes (total) (ug/L)	MTBE (ug/L)	Naphthalene (ug/L)	Benzo(a) anthracene (ug/L)	Benzo(b) fluoranthene (ug/L)	Benzo(k) fluoranthene (ug/L)	Chrysene (ug/L)	Dibenzo(a,h) anthracene (ug/L)	Cadmium (ug/L)
RBSL [1]	**5**	**700**	**1,000**	**10,000**	**40**	**10**	**10**	**10**	**10**	**10**	**10**	**5**
NBCT200TW01 [2]	**13.7**	20.2	1.07	25.9	ND	**524**	ND	ND	ND	ND	ND	0.216
NBCT200TW02	ND	ND	0.6	ND	ND	**14.3**	ND	ND	ND	ND	ND	0.381
NBCT200TW03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.213
NBCL037001I	ND	ND	1.17	ND	ND	4.04	ND	ND	ND	ND	ND	0.644

Notes:

Sample Collection Date: April 1998.

[1] RBSL for groundwater.

[2] Historical presence of free product in well NBCT200TW01

TABLE 6

SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN GROUNDWATER
APRIL 12, 2001
UST 200, BUILDING NS200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Monitoring Well I.D.	Benzene (µg/l)	Ethylbenzene (µg/l)	Toluene (µg/l)	Xylenes (Total) (µg/l)	Naphthalene (µg/l)
RBSL [1]	**5**	**700**	**1,000**	**10000**	**10**
NBCT200TW01[2]	0.27J	ND	0.23J	0.32J	0.68J
NBCT200TW02	ND	ND	ND	ND	0.25J
NBCT200TW03	ND	ND	ND	ND	0.19J
NBCL037001I	ND	ND	ND	ND	0.17J
Trip Blank	ND	ND	ND	ND	0.24J

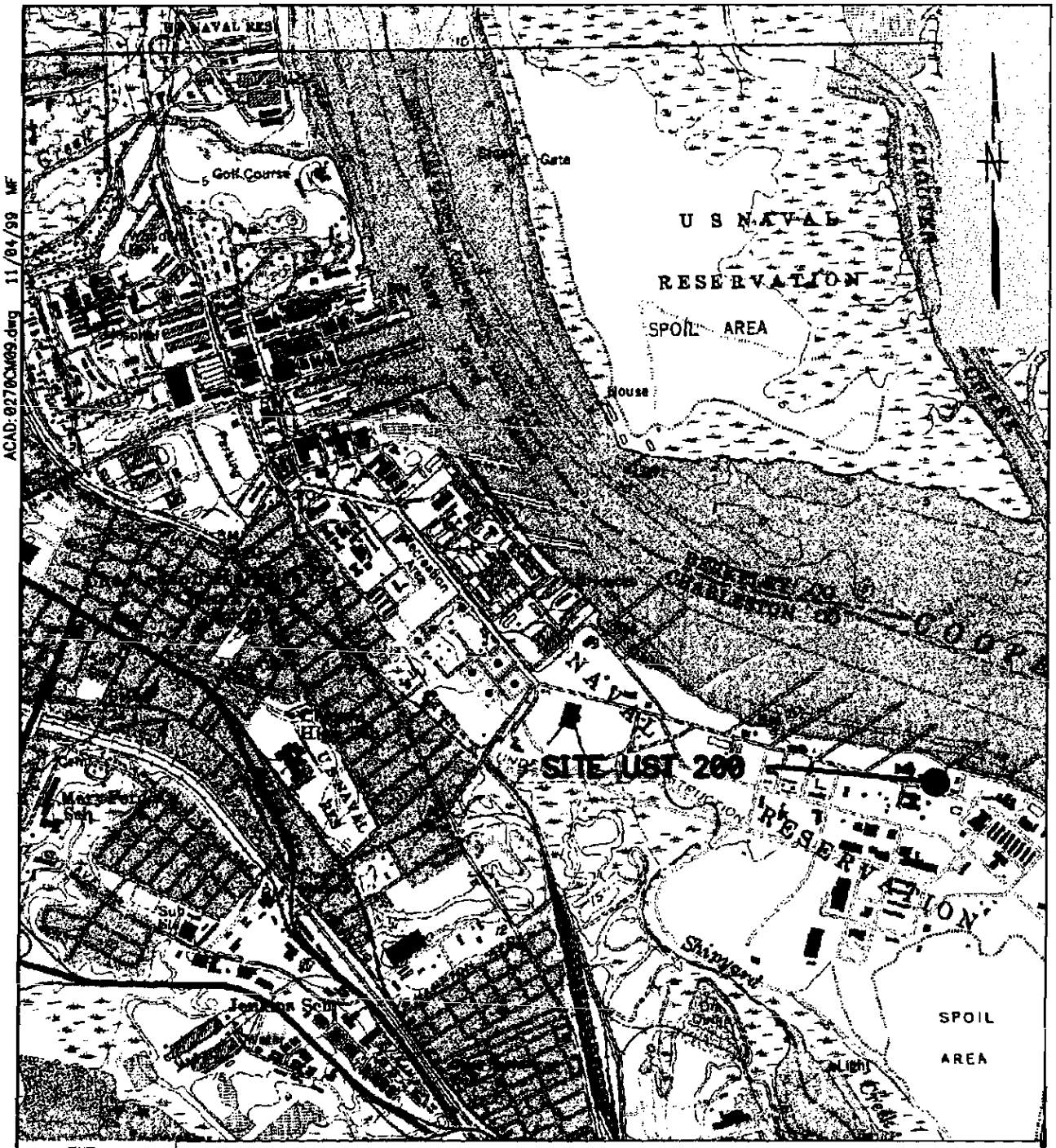
Notes:

[1] RBSL for groundwater

[2] Historical presence of free product in well NBCT200TW01

J = Analyte is present at a concentration that is less than the reporting limit and greater than the detection limit.

ND = Analyte not detected above method detection level.



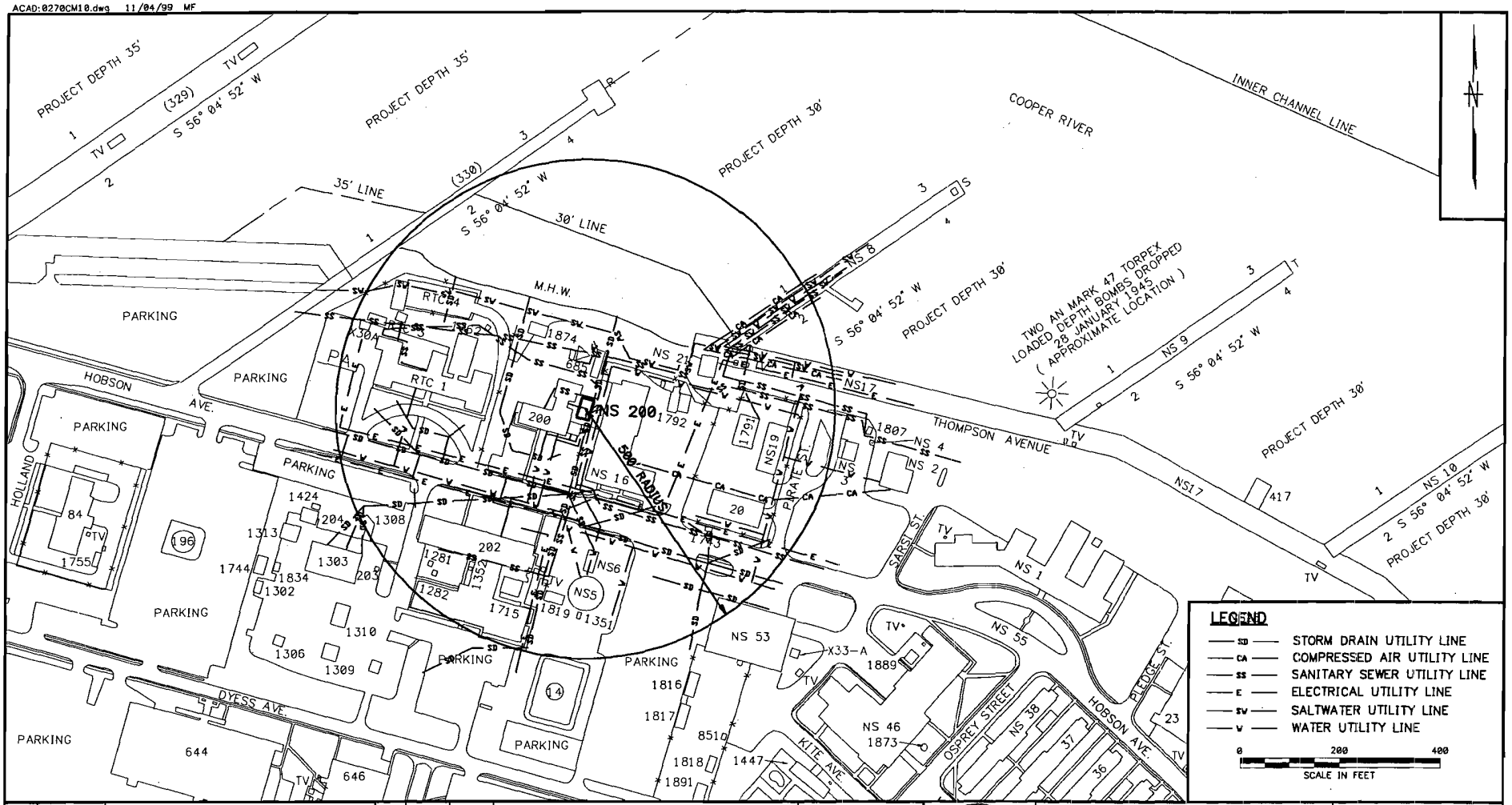
SOURCE: QUADRANGLE MAP SOUTH CAROLINA, REVISED 1979
QUADRANGLE MAP NORTH CHARLESTON REVISED, 1979

DRAWN BY MF DATE 11/4/99		SITE LOCATION MAP SITE UST 200, BUILDING NS200 ZONE I, CHARLESTON NAVAL COMPLEX NORTH CHARLESTON, SOUTH CAROLINA	CONTRACT NO. 0270
CHECKED BY DATE			APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1 / REV. 0

ACAD: 0270CM99.dwg 11/04/99 MF

FORM CADD NO. SDIV_AV.DVG - REV 0 - 1/20/98

ACAD:0270CM10.dwg 11/04/99 MF



LEGEND

- SD — STORM DRAIN UTILITY LINE
- CA — COMPRESSED AIR UTILITY LINE
- SS — SANITARY SEWER UTILITY LINE
- E — ELECTRICAL UTILITY LINE
- SW — SALTWATER UTILITY LINE
- W — WATER UTILITY LINE

0 200 400
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

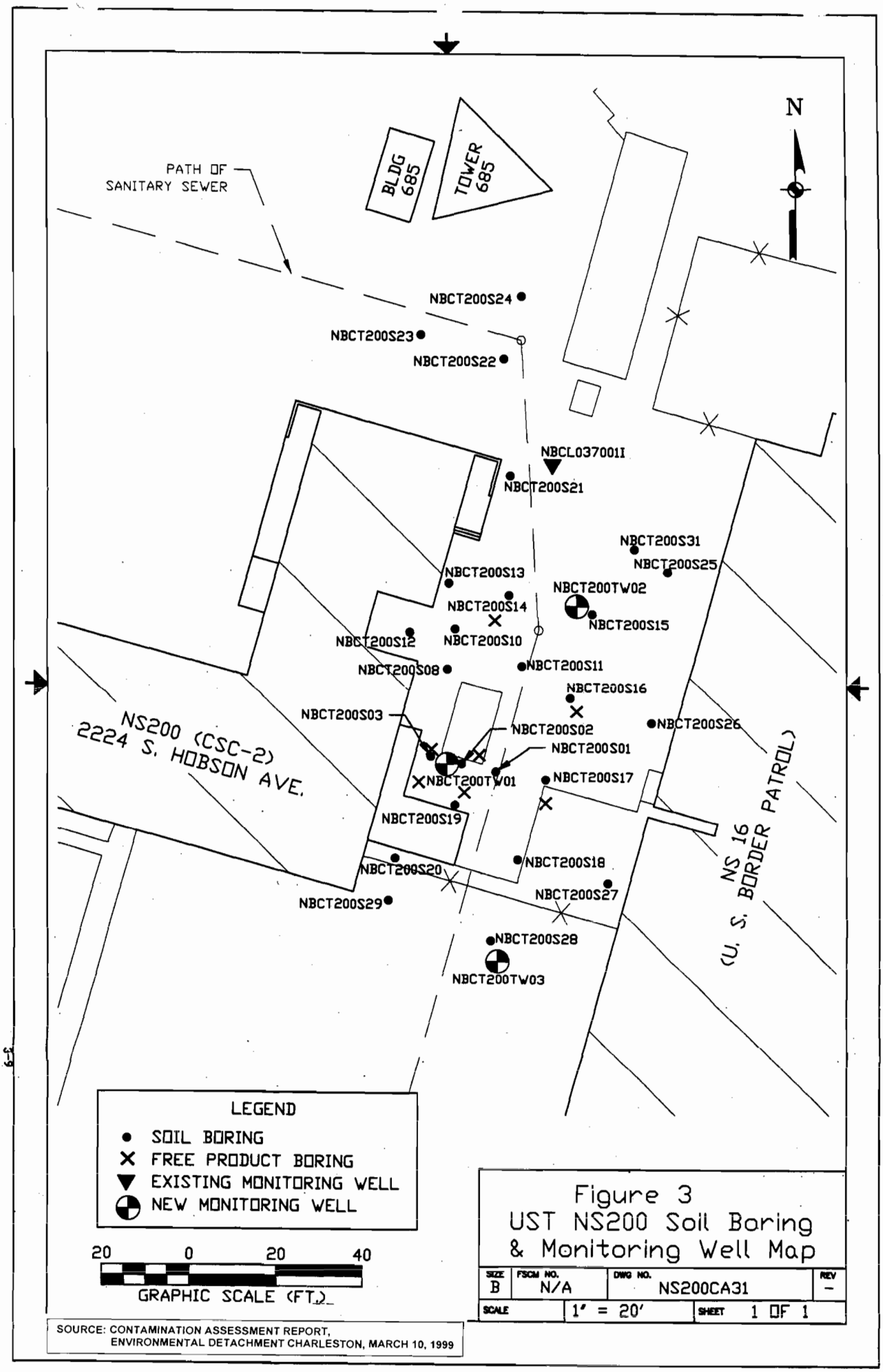
DRAWN BY MF DATE 11/4/99
CHECKED BY DATE
COST/SCHED--AREA
SCALE AS NOTED

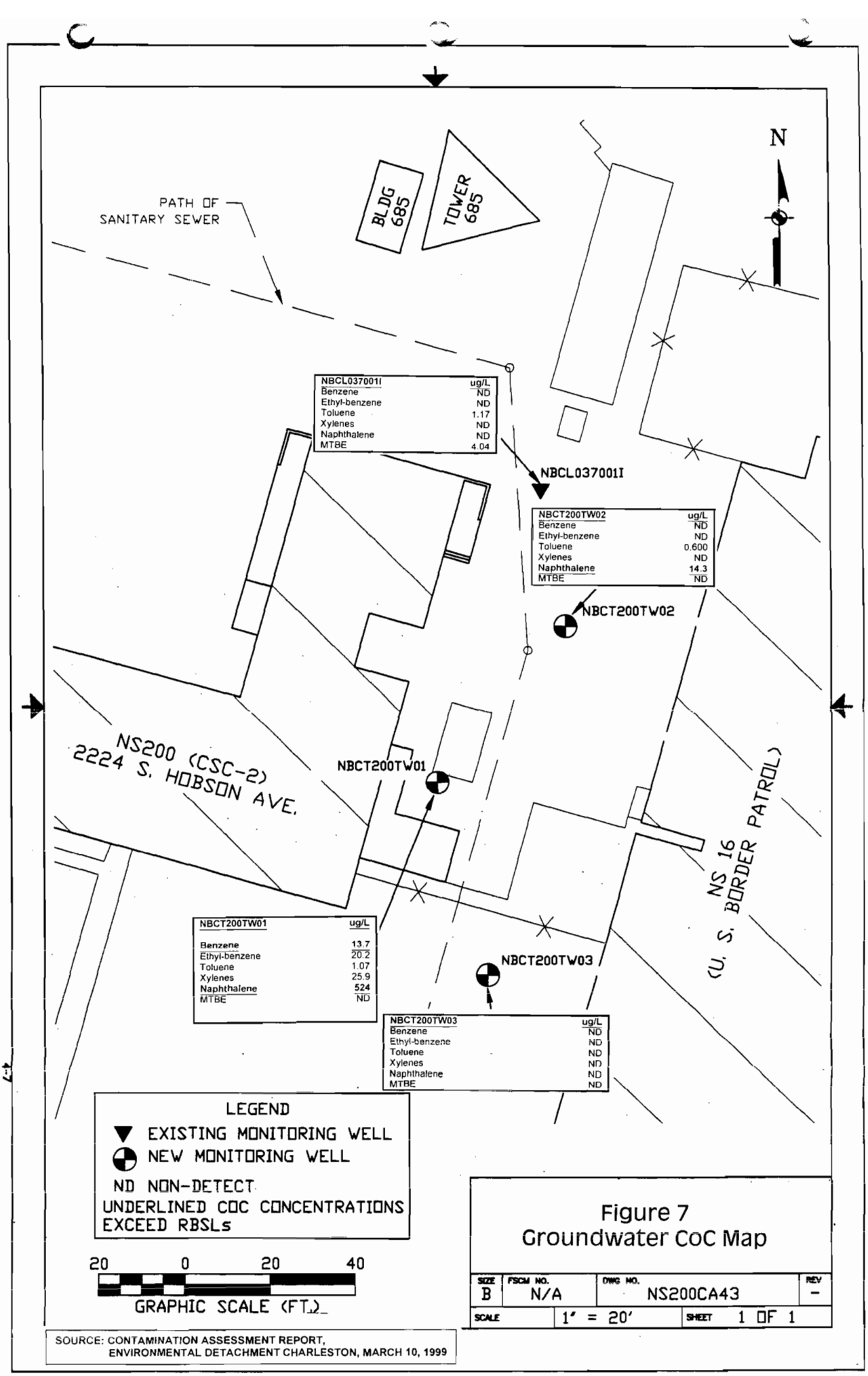
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

SITE VICINITY MAP
SITE UST 200, BUILDING NS 200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0270
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 2
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98


N
PATH OF SANITARY SEWER
BLDG 685
TOWER 685
NBCT200S24
NBCT200S23
NBCT200S22
NBCL037001I
NBCT200S21
NBCT200S31
NBCT200S25
NBCT200S13
NBCT200TW02
NBCT200S14
NBCT200S15
NBCT200S12
NBCT200S10
NBCT200S08
NBCT200S11
NBCT200S16
NBCT200S03
NBCT200S02
NBCT200S26
NBCT200S01
NBCT200TW01
NBCT200S17
NBCT200S19
NBCT200S20
NBCT200S18
NBCT200S29
NBCT200S27
NBCT200S28
NBCT200TW03
NS200 (CSC-2)
2224 S. HOBSON AVE.
NS 16
(U. S. BORDER PATROL)
LEGEND
SOIL BORING
FREE PRODUCT BORING
EXISTING MONITORING WELL
NEW MONITORING WELL
20 0 20 40
GRAPHIC SCALE (FT.)
SOURCE: CONTAMINATION ASSESSMENT REPORT, ENVIRONMENTAL DETACHMENT CHARLESTON, MARCH 10, 1999
Figure 3
UST NS200 Soil Boring & Monitoring Well Map
SIZE B
FSCM NO. N/A
DWG NO. NS200CA31
REV -
SCALE 1" = 20'
SHEET 1 OF 1

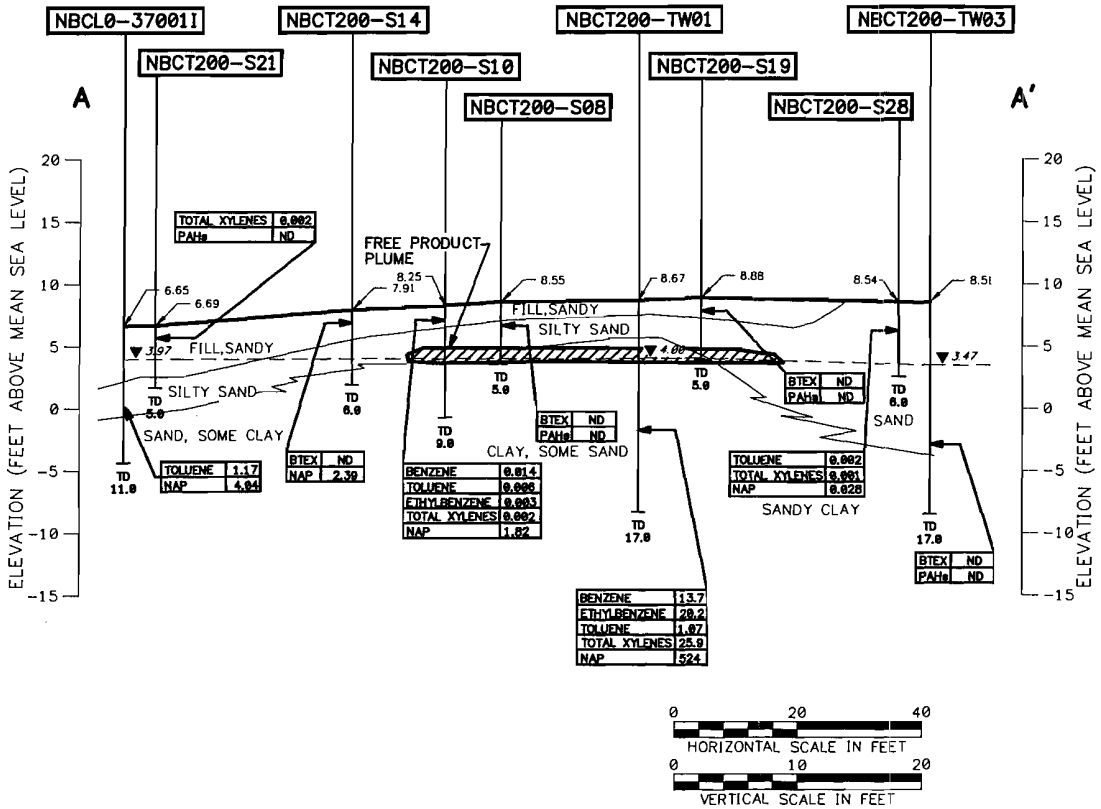


SOURCE: CONTAMINATION ASSESSMENT REPORT, ENVIRONMENTAL DETACHMENT CHARLESTON, MARCH 10, 1999

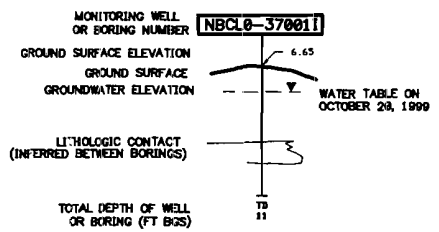
Figure 7
Groundwater CoC Map

SIZE	FSCM NO.	DWG NO.	REV
B	N/A	NS200CA43	–
SCALE	1" = 20'	SHEET	1 OF 1

ACAD:0270GX03.dwg 11/29/99 HJP



LEGEND:



NOTE: ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (FT AMSL)

SOIL PARAMETER CONCENTRATIONS ARE (mg/kg) AT SAMPLE DEPTH

GROUNDWATER PARAMETER CONCENTRATIONS ARE (ug/L) AT SAMPLE DEPTH

BTEX = BENZENE, TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES

NAP = NAPHTHALENE

PAHs = POLYNUCLEAR AROMATIC HYDORCARBONS

ND = NOT DETECTED (BELOW LABORATORY REPORTING LIMITS)

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

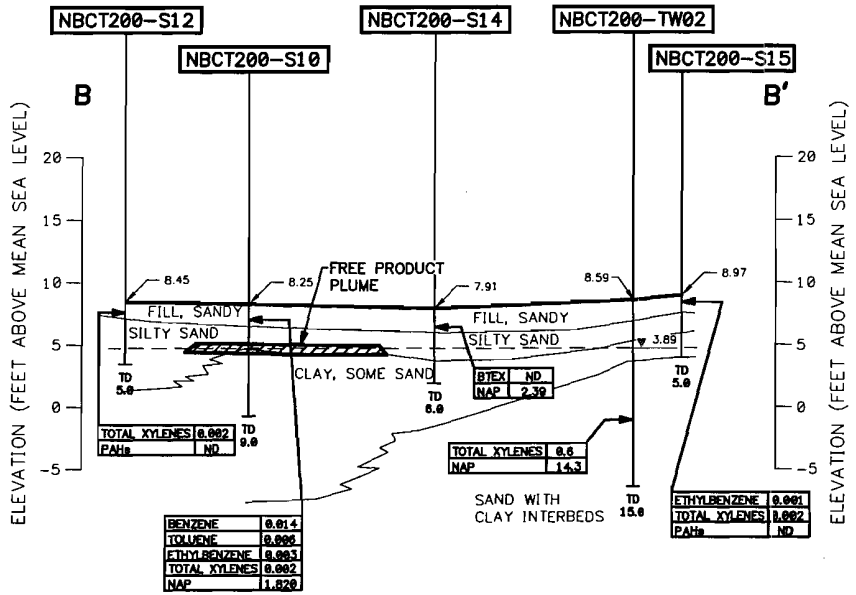
DRAWN BY HJP DATE 11/14/99
CHECKED BY DATE
COST/SCHED--AREA
SCALE AS NOTED

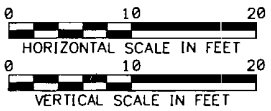
GEOLOGICAL CROSS SECTION A-A'
SITE UST 200, BUILDING NS 200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0270
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 4
REV. 0

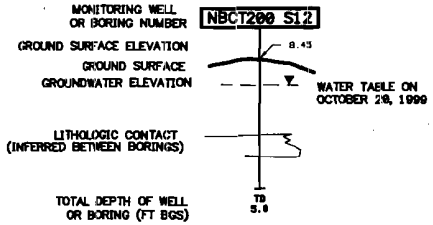
FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

ACAD:0270GX04.dwg 11/30/99 HJP





LEGEND:



NOTE: ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (FT AMSL)

SOIL PARAMETER CONCENTRATIONS (mg/Kg) AT SAMPLE DEPTH
GROUNDWATER PARAMETER CONCENTRATIONS (ug/L) AT SAMPLE DEPTH

BTEX = BENZENE, TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES

NAP = NAPHTHALENE

PAHs = POLYNUCLEAR AROMATIC HYDORCARBONS

ND = NOT DETECTED (BELOW LABORATORY REPORTING LIMITS)

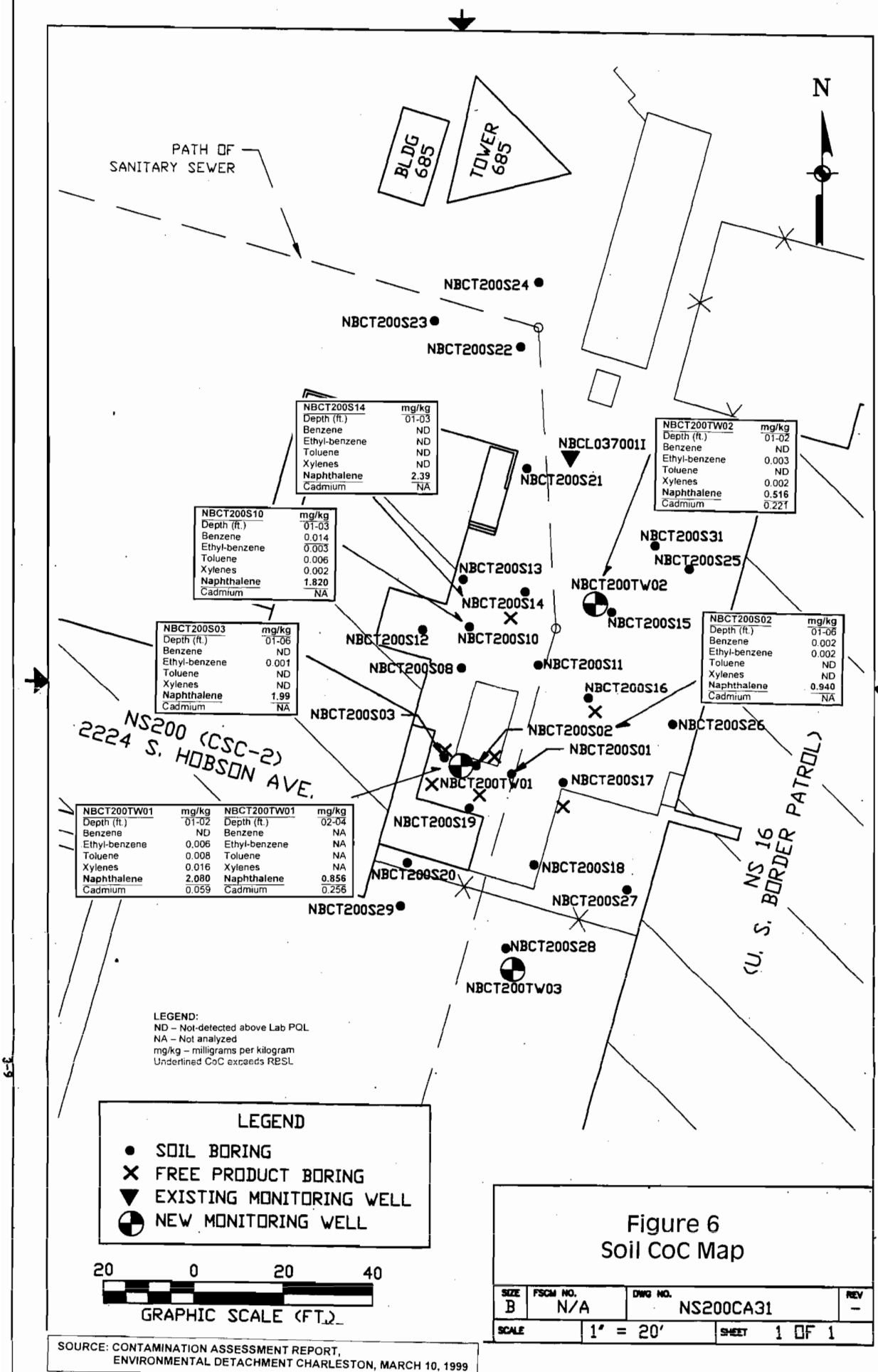
NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 11/24/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

GEOLOGICAL CROSS SECTION B--B'
SITE UST 200, BUILDING NS 200
ZONE I, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0270
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 5
REV. 0

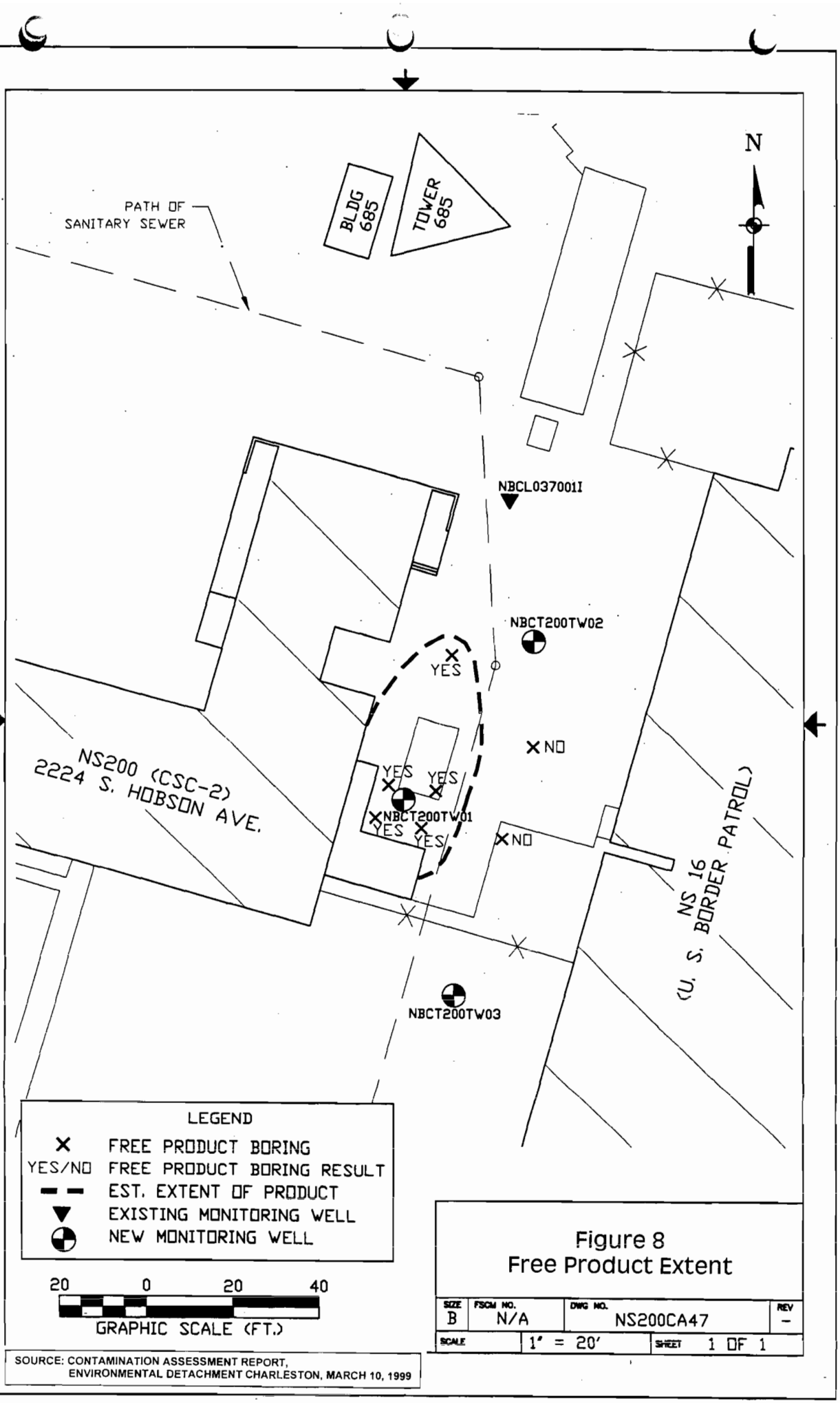
FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98



SOURCE: CONTAMINATION ASSESSMENT REPORT, ENVIRONMENTAL DETACHMENT CHARLESTON, MARCH 10, 1999

Figure 6
Soil CoC Map

SIZE	FSCM NO.	DWG NO.	REV
B	N/A	NS200CA31	–
SCALE	1" = 20'	SHEET	1 OF 1


N
PATH OF SANITARY SEWER
BLDG 685
TOWER 685
NBCL037001I
NBCT200TW02
YES
NO
YES
YES
NBCT200TW01
YES
YES
NO
NS200 (CSC-2)
2224 S. HOBSON AVE.
NS 16
(U. S. BORDER PATROL)
NBCT200TW03
LEGEND
FREE PRODUCT BORING
YES/NO FREE PRODUCT BORING RESULT
EST. EXTENT OF PRODUCT
EXISTING MONITORING WELL
NEW MONITORING WELL
20 0 20 40
GRAPHIC SCALE (FT.)
SOURCE: CONTAMINATION ASSESSMENT REPORT, ENVIRONMENTAL DETACHMENT CHARLESTON, MARCH 10, 1999
Figure 8
Free Product Extent
SIZE B
FSCM NO. N/A
DWG NO. NS200CA47
REV –
SCALE 1" = 20'
SHEET 1 OF 1

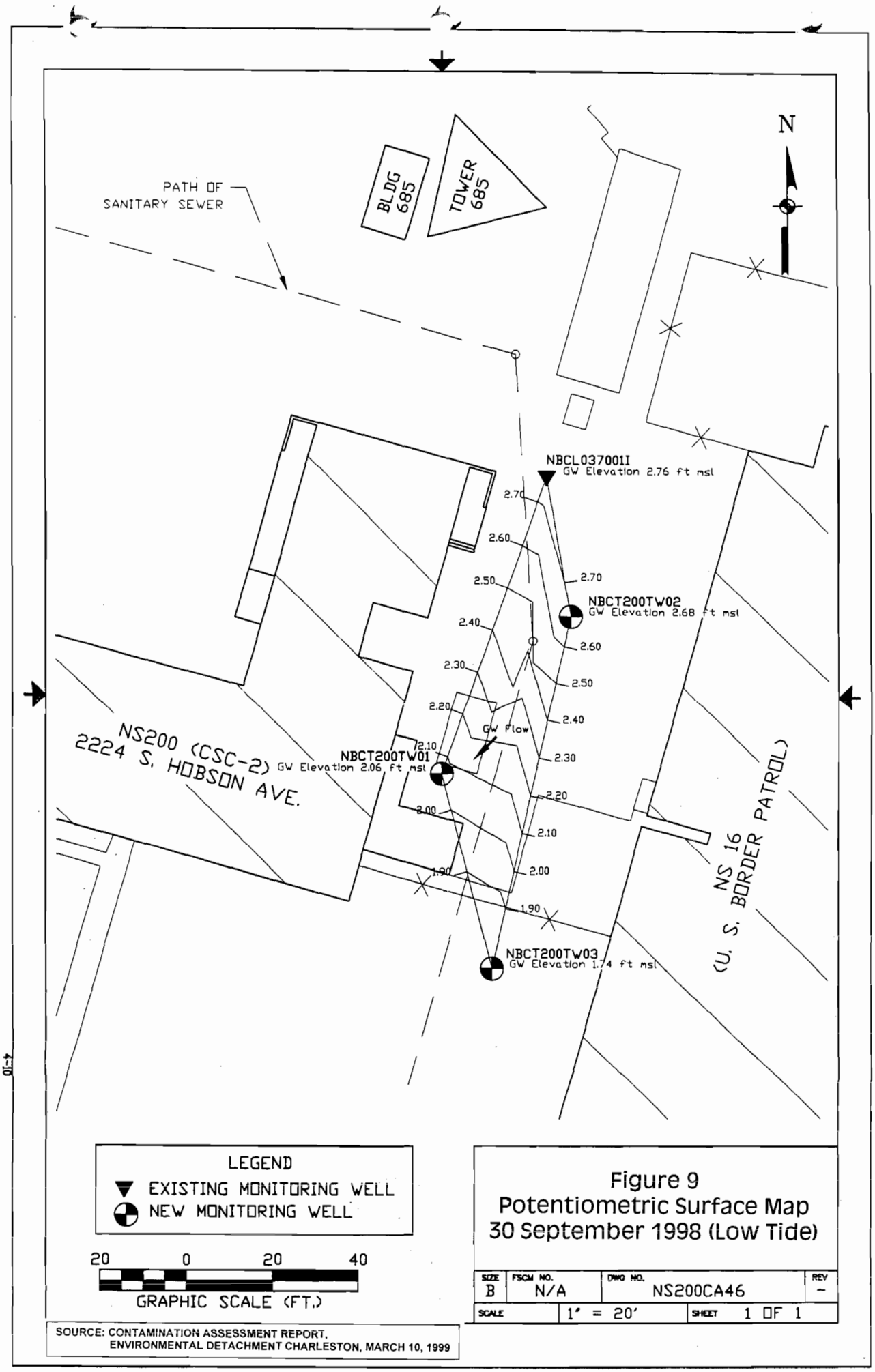


Figure 9
Potentiometric Surface Map
30 September 1998 (Low Tide)

SIZE	FSCM NO.	DWG NO.	REV
B	N/A	NS200CA46	-
SCALE	1" = 20'	SHEET	1 OF 1

SOURCE: CONTAMINATION ASSESSMENT REPORT,
ENVIRONMENTAL DETACHMENT CHARLESTON, MARCH 10, 1999